

*Concluded  
A1b C2  
cont.*

sides of said first optical waveguide to guide unnecessary light outputted from said first optical waveguide.

10. (NEW) An optical circuit comprising:

a first optical waveguide formed on said substrate connecting optical elements to guide signal light outputted from one optical element to another; and

a second optical waveguide formed on the substrate to guide subsidiary light emitted from said first optical waveguide.

#### REMARKS

In accordance with the foregoing, the specification and claim 8 has been amended, and claim 9 has been added. Claims 1-10 are pending and under consideration. It is noted that claim 8 has been amended merely to provide proper dependency, and therefore this amendment does not narrow the pending claims within the meaning of *Festo Corporation v. Shoketsu Kinzoku Kogyo Kabushiki Co., Ltd.*

Applicant notes with appreciation the Examiner's indication that claims 6 and 8 contain allowable subject matter, and that these claims would be allowed if placed in independent form. However, it is respectfully submitted that all of the pending claims 1-9 are allowable for at least the following reasons.

Figure 1 was objected to for using the reference characters "11" and "12" twice. Applicants provide new corrected FIGS. 1a-1b, 2a-2c, 3a-3d, 4a-4c, 6a-6f, 7a-7c and 8a-8d to address each of the Examiner's concerns as well as to correct any possible inconsistencies throughout the figures. Accordingly, acceptance of the corrected formal drawings is respectfully requested.

#### **REJECTION UNDER 35 USC 102**

Claims 1-2 and 4 were rejected under 35 U.S.C. 102(b) as being anticipated by Inoue et al (US 5,117,470). This rejection is respectfully traversed for the reasons stated below.

The Examiner states that Inoue et al. includes a plurality of Mach-Zehner interferometer type optical elements, a first waveguide 62 (in FIG. 32), a second waveguide 61 (in FIG. 32). However, although member 61 in figure 32 of Inoue et al., as relied upon by the Examiner, is

disclosed as an optical waveguide, this optical waveguide is not taught or suggested as "guiding light which is emitted or leaking from said optical coupling part" of the first optical element, as recited in claim 1, as amended. Accordingly, it is respectfully submitted that Inoue et al. does not teach or suggest every feature of the present invention as recited in claim 1, and therefore does not anticipate independent claim 1.

It is respectfully submitted that since Inoue et al. does not teach each feature of independent claim 1 as recited, this claim is allowable over Inoue et al., and withdrawal of this rejection and allowance of this claim is earnestly solicited.

Further, for at least the reason that claims 2 and 4 depend from allowable independent claim 1, it is respectfully submitted that these claims are also allowable over Inoue et al..

#### **REJECTIONS UNDER 35 USC 103**

##### ***Rejection of claim 3***

Claim 3 was rejected under 35 U.S.C. 103(a) as being unpatentable over Inoue et al., and further in view of House (US 6,298,177). This rejection is respectfully traversed for the following reasons.

As stated supra, Inoue et al. does not teach or suggest an optical waveguide "guiding light which is emitted or leaking from said optical coupling part" of the first optical element, as recited in claim 1. Further, although House discloses an optical phase modulator, it does not teach or suggest, among other things, an optical waveguide "guiding light which is emitted or leaking from said optical coupling part" of the first optical element, as recited in claim 1, which is also missing from the teachings of Inoue et al. Accordingly, it is respectfully submitted that since neither Inoue et al. nor House teach or suggest an optical waveguide as recited in independent claim 1, or claim 3, which depends therefrom, both claims 1 and 3 are allowable over both Inoue et al. and House, or any hypothetical combination thereof. For at least the above reasons, withdrawal of this rejection and allowance of claim 3 are respectfully solicited.

##### ***Rejection of claim 5***

Claim 5 was rejected under 35 U.S.C. 103(a) as being unpatentable over Inoue et al., and further in view of Asano et al. (US 5,621,839). This rejection is respectfully traversed for the following reasons.

As stated supra, Inoue et al. does not teach or suggest an optical waveguide "guiding

light which is emitted or leaking from said optical coupling part" of the first optical element, as recited in claim 1. Further, although Asano et al. discloses an optical waveguide made of Ferroelectric crystals, it does not teach or suggest, among other things, an optical waveguide "guiding light which is emitted or leaking from said optical coupling part" of the first optical element, as recited in claim 1, which is also missing from the teachings of Inoue et al. Accordingly, it is respectfully submitted that since neither Inoue et al. nor Asano et al. teach or suggest an optical waveguide as recited in independent claim 1, or claim 5, which depends therefrom, independent claim 1 and claim 5 are allowable over both Inoue et al. and Asano et al., or any hypothetical combination thereof. For at least the above reasons, withdrawal of this rejection, and allowance of claim 5 are respectfully solicited.

***Rejection of claim 7***

Claim 7 was rejected under 35 U.S.C. 103(a) as being unpatentable over Inoue et al., and further in view of Hosoi (US 5,475,771). This rejection is respectfully traversed for the following reasons.

As stated supra, Inoue et al. does not teach or suggest an optical waveguide "guiding light which is emitted or leaking from said optical coupling part" of the first optical element, as recited in claim 1. Further, although Hosoi discloses a single optical waveguide made of lithium nobate in the background section thereof, it does not teach or suggest, among other things, an optical waveguide "guiding light which is emitted or leaking from said optical coupling part" of the first optical element, as recited in claim 1, which is also missing from the teachings of Inoue et al. Accordingly, it is respectfully submitted that since neither Inoue et al. nor Hosoi teach or suggest an optical waveguide as recited in independent claim 1, or claim 7, which depends therefrom, both claims 1 and 7 are allowable over Inoue et al. and Hosoi, or any hypothetical combination thereof. For at least the above reasons, withdrawal of this rejection, and allowance of claim 7 are respectfully solicited.

***New claims***

Applicants respectfully submit that new claims 9-10 are allowable over the prior art of record for at least the reason that the prior art of record does not teach or suggest, among other things, "a pair of second optical waveguides formed on said substrate and formed on both sides of said first optical waveguide to guide unnecessary light outputted from said first optical waveguide," as recited in claim 9, or "a second optical waveguide formed on the substrate to guide subsidiary light emitted from said first optical waveguide," as recited in

claim 10.

### CONCLUSION

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

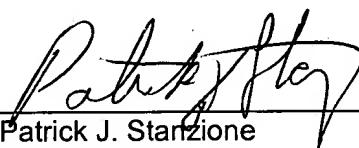
If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

STAAS & HALSEY LLP

Date: Oct 8, 2002

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**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

**IN THE SPECIFICATION:**

Please AMEND the second full paragraph at page 4 as follows:

Figs. [1] 1(a) and 1(b) are views each showing the principle configuration of the invention;

Please AMEND the third full paragraph at page 4 as follows:

Figs. [2] 2(a) through 2(c) are views each showing the construction of an optical modulator according to an embodiment of the invention;

Please AMEND the fourth full paragraph at page 4 as follows:

Figs. [3] 3(a) through 3(d) are cross-sectional views each showing respective sections of an optical modulator according to the embodiment;

Please AMEND the fifth full paragraph at page 4 as follows:

Figs. [4] 4(a) through 4(c) are views each explaining the main signal light and emissive light in an MZ type optical waveguide;

Please AMEND the seventh full paragraph at page 4 as follows:

Figs. [6] 6(a) through 6(f) are views each showing a producing process of an optical waveguide in an optical modulator according to the embodiment;

Please AMEND the eight full paragraph at page 4 as follows:

Figs. [7] 7(a) through 7(c) are a view showing the entire construction of an optical waveguide according to the invention and partially enlarged views showing a part from the Y-shaped coupling part R2 to the Y-shaped dropping part R1; and

Please AMEND the ninth full paragraph at page 4 as follows:

Figs. [8] 8(a) through 8(d) are views each showing an example of other patterns of the optical waveguide according to the invention.

Please AMEND the first full paragraph at page 5 as follows:

Figs. [1] 1(a) and 1(b) are views each showing the principle construction of the invention, wherein Fig. 1(a) is a view showing the entire construction thereof, and Fig. 1(b) is a partially enlarged view showing a part "a" surrounded by broken lines in Fig. (a).

Please AMEND the second full paragraph at page 5 as follows:

In Figs. [1] 1(a) and 1(b), a substrate 11 having a plurality of optical elements 12 formed thereon is provided with the first optical waveguide 13 and the second optical waveguide 14.

Please AMEND the fourth full paragraph at page 5 as follows:

In Figs. [1] 1(a) and 1(b), solid lines denominate the first optical waveguide 13 that guides the main light for which the state of light is controlled by the optical element 12, and dotted sections denominate the second optical waveguide 14 that guides subsidiary light such as emissive light and leaking light, which excludes the main light.

Please AMEND the sixth full paragraph at page 6 as follows:

Figs. [2] 2(a) through 2(c) show a construction of an optical modulator according to the embodiment.

Please AMEND the first full paragraph at page 7 as follows:

Figs. [3] 3(a) through 3(d) show respective sections of the optical modulator according to the embodiment.

Please AMEND the third full paragraph at page 7 as follows:

Figs. [4] 4(a) through 4(c) are views explaining the main light signals and emissive light in a Mach-Zehnder type optical waveguide.

Please AMEND the fourth full paragraph at page 7 as follows:

In Figs. [2] 2(a) through 2(c) and Figs. [4] 4(a) through 4(c), an optical modulator according to the embodiment is such that an optical waveguide 32 that guides main light signals is formed on a lithium niobate (Z plate) substrate 31. The optical waveguide 32 is formed to be

an MZ type at three points in the intermediate portion. The MZ type optical waveguide 32 includes an input optical waveguide 32a, an output optical waveguide 32b and intermediate optical waveguides 32c and 32d at respective points as shown in Figs. [4] 4(a) through 4(c). The intermediate portions 32c and 32d are connected to each other in parallel via a Y-shaped dropping part R1 and a Y-shaped coupling part R2 between the input optical waveguide 32a and the output optical waveguide 32b.

Please AMEND the fifth full paragraph at page 7 as follows:

[A] One of travelling-wave electrodes [33] 33-1 to 33-3 is formed on the upper part of one of the intermediate optical waveguides 32c and 32d, respectively, and [a] one of ground electrodes [34] 34-1 to 34-3 is formed on the upper part of the other, respectively.

Please AMEND the third full paragraph at page 12 as follows:

Fig. [6] 6(a) through 6(f) shows a process of producing an optical waveguide in an optical modulator according to the embodiment.

Please AMEND the fourth full paragraph at page 7 as follows

In addition, Figs. [6] 6(a) through 6(f) correspond to the substrate 31 and optical waveguides 32 and 36 on the cross section taken along the line A-A' in Fig. 2(a).

Please AMEND the eight full paragraph at page 12 continuing on page 13 as follows:

According to standard photolithography and micro-treatment, patterning is performed (Fig. 6(e)) so that titanium 102-1 remains on the surface of the substrate 31 corresponding to the portion to become an optical waveguide 32 that guides main light signals, so that titanium 102-2 remains on the surface of the substrate 31 corresponding to the portion to become an optical waveguide 36 that guides leaking light and emissive light, and so that titanium remains on the surface of the substrate 31 corresponding to the portion to become an optical waveguide 35 that guides the leaking light and emissive light for controlling the operating point shifting (not illustrated in Figs. [6] 6(a) through 6(f)).

Please AMEND the third partial paragraph at pages 14 continuing on page 15 as follows:

As described with reference to Figs. [4] 4(a) through 4(c), even if leaking light and

emissive light are generated in the Y-shaped coupling part R2-2 of the first optical modulating part 22, the leaking light and emissive light are inputted into the optical waveguides 36-1 and 36-2 provided at both sides of the output optical waveguide 32b-2 and are led out to the outside of the substrate 31.

Please AMEND the second full paragraph at page 16 as follows:

Figs. [7] 7(a) through 7(c) are a view showing the entire construction of an optical waveguide according to the invention and partially enlarged views showing a part from the Y-shaped coupling part R2 to the Y-shaped dropping part R1.

Please AMEND the first full paragraph at page 18 as follows:

Figs. [8] 8(a) through 8(d) are views showing examples of other patterns of the optical waveguide according to the invention.

Please AMEND the second partial paragraph at page 18 as follows:

In the embodiment as shown in Figs. [2] 2(a) through 2(c), in the optical waveguide that guides leaking light and emissive light, an optical waveguide that guides leaking light and emissive light of the variable optical attenuating part 21, and an optical waveguide that guides leaking light and emissive light of the first optical modulating part 22 are formed integral with each other to form optical waveguides 36-1 and 36-2 having plane-like upper surfaces.

#### IN THE CLAIMS:

Please AMEND the following claims:

1. (ONCE AMENDED) An optical circuit comprising:

[a substrate having a plurality of optical elements formed;]

a first optical [waveguide] element formed on [said] a substrate [for] guiding light [to be outputted from said optical elements] and having an optical coupling part; [and]

a second optical [waveguide] element formed on said substrate [for] guiding light from the first optical element; and

an optical waveguide formed on the substrate guiding light which is emitted or leaking from said [first] optical [waveguide] coupling part.

5. (ONCE AMENDED) The optical circuit according to Claim 1, wherein said substrate is made of [a] ferroelectric material.

8. (ONCE AMENDED) The optical circuit according to Claim [7] 1, wherein light [outputted] from said [plurality of] first optical [elements] element is [inputted into said first] formed in a Mach-Zehnder [optical modulating part via a variable optical attenuating part capable of] interferometer structure to [attenuating] attenuate light intensity and [varying] vary an amount of attenuation.

Please ADD the following claims:

9. (NEW) An optical circuit comprising:  
a substrate having at least two optical elements;  
a first optical waveguide formed on said substrate and connecting said optical elements to guide signal light outputted from an upstream optical element to a downstream optical element; and  
a pair of second optical waveguides formed on said substrate and formed on both sides of said first optical waveguide to guide unnecessary light outputted from said first optical waveguide.

10. (NEW) An optical circuit comprising:  
a first optical waveguide formed on said substrate connecting optical elements to guide signal light outputted from one optical element to another; and  
a second optical waveguide formed on the substrate to guide subsidiary light emitted from said first optical waveguide.

CERTIFICATE UNDER 37 CFR 1.8(a)  
I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, D.C. 20231 on October 8, 2002  
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By: Ruth M. Rie  
Date: October 8, 2002